STATUS OF THE CLAIMS

Claims 1 – 6 and 17 -25 are pending.

Claims 1 – 6 and 17 -25 stand rejected.

Claim 1 and 17 have been amended, without prejudice or disclaimer.

Claims 7 – 16 were previously cancelled, without prejudice.

REMARKS

35 U.S.C. § 103 Rejection

Claims 1, 2, 4-6, 17, 18, 21-23 and 25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lin (U.S. Patent 6,421,466) in view of Frey (U.S. Patent 5,925,875).

Claims 1 and 17 have been amended only to clarify an aspect of applicant's invention. Support can be found throughout the specification including in Paragraph 44. Accordingly no new matter has been added.

The invention as recited in claim 1 includes a recognition of and a solution to the problem that a dithering pattern on a moving object in a video may become visible to the viewer when the video is displayed, while the same dithering pattern is not visible on a static object.

The rejection of Claim 1 is respectfully traversed for the following reasons which will be discussed in detail below: First, Lin and Frey fail both alone and in combination to teach or suggest all of the limitations of amended Claim 1. Further, for reasons discussed below the Examiner has incorrectly asserted Frey's "phase shifting of a reference signal" as functionally equivalent to

"changing spatial resolution" as recited in Claim 1 and therefore fails to establish a prima facie case of obviousness. Additionally, the use of term "dithering" by Frey and Lin, which has a different meaning and is used for different purposes in the context of each reference, is incorrectly used to provide a rational underpinning for the combination of Lin and Frey and is thus traversed. Finally, the Examiner's proposed modification of Lin based on the teaching of Frey would render the invention of Lin unusable for its intended purpose. Accordingly, one of ordinary skill in the art would not be motivated to combine the teachings of Lin and Frey.

Combination Fails to Teach or Suggest All Claim Limitations

To establish a prima facie case of obviousness, all of the recited claim limitations must be taught or suggested in the prior art. See, MPEP 2143.03; see also, In re. Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). For the following reasons Lin and Frey fail alone or in combination to teach or suggest all of the limitations of amended Claim 1.

Lin "relates to digital-video compression, and more particularly to motion estimation for video compression" (See, Column 1, lines 6-8) and discloses therefore "a motion estimator and a method for compressing digital-video images", which employs motion estimation for video compression. Motion estimation involves evaluation of motion vectors. Motion vectors represent the movement of a macro block (a group of pixels) between the previous frame and the current frame. Lin discloses that "Each macroblock contains 16x16 pixels. A

macroblock from a current frame or picture is compared to a range of macroblocks in a previous picture in the video sequence. ...**The difference in locations is known as a motion vector, since it indicates the movement of the macroblock between the two pictures. The motion vector rather than the entire macroblock can then be encoded for the new picture**, saving storage space." See, Column 1, lines 22-30 (emphasis added). In order to compress the video, instead of encoding a whole macro block, the motion vector corresponding to this macro block is encoded. In contrast to Claim 1, where motion estimation is used for modifying a dithering function, Lin employs motion estimation for video compression. It is furthermore evident from Lin (see column 2, lines 2-6), that the number of bits is reduced, for example, by dithering, as Lin states: "Computing requirements can be reduced by using a pyramid or hierarchical motion-estimation search. Pixels are averaged together to reduce the number of pixels in the picture, so that smaller search ranges and smaller macroblocks are used. This reduces the number of calculations." In other words, pictures with reduced sizes are used for determining the motion between the frames. "The inventor has realized that storage requirements for intermediate levels (resolutions) of pictures can be reduced by reducing the bit-width of pixels within the pictures." (see column 5. lines 36-38) Lin therefore proposes to save memory by reducing the number of bits used for these pictures.

Lin discloses that this conversion can be done by a simple truncation, which involves taking the most-significant-bits and discarding the least-

significant-bits, or by using dithering. Lin discloses that "Width reduction can be performed by taking the 6 most-significant-bits (MSBs) of the 8-bit pixel" (see column 8, lines 17-18) as well that "Other more complex **width-reduction methods can be used, such as dithering** or averaging with a matrix, non-linear or piece wise-linear (PWL) reduction, or using a histogram of the video sequence to determine a range where most of the pixels are, and then scaling and offsetting the pixels." (see column 8, lines 18-24).

Dithering is a well known technique to convert a picture to another picture, the pixels of which are encoded with fewer bits.

Lin teaches the use of dithering to reduce the number of bits used to represent a picture and subsequent use of the resulting dithered pattern for simplified (less bit) motion estimation. Dithering therefore occurs **prior** to motion estimation. In contradistinction, amended Claim 1 recites "changing at least one of the phase, amplitude, spatial resolution and temporal resolution of said dithering function *in accordance with said at least one motion vector...*" and "outputting said dithered video data to the display device to eliminate a dithering pattern from appearing to a viewer observing said video data." The Examiner concedes that Lin does not explicitly disclose "changing at least one of the phase, amplitude, spatial resolution and temporal resolution of the dithering in accordance with the calculation of the motion vector." Lin also clearly fails to disclose or suggest "outputting said dithered video data to the display device to

eliminate a dithering pattern from appearing to a viewer observing said video data" as is required by amended Claim 1.

In an effort to address the deficiencies of Lin the Examiner looks to Frey, however Frey also fails to teach or suggest at least each of these limitations. Frey fails to teach "outputting said dithered video data to the display device to eliminate a dithering pattern from appearing to a viewer observing said video data" as required by amended Claim 1. Frey is directed to an apparatus for reducing fixed pattern noise in an image observed by an array of detectors; displaying the processed video data is not taught or even suggested by Frey.

Incorrect Assertion of Functional Equivalence

Frey relates "to arrays of image detectors and more particularly to the use of **a dithering device to correct for differences in the responses of the individual image detectors** forming the array."(column 1, lines 13-16) (emphasis added).

Frey dithers (moves with a small amplitude) an image sensor following a predetermined pattern. Frey discloses, "Dither is the intentional motion of the observed image with respect to the sensing array." (See Column 5, lines 13-15) This indicates that the terms "dithering" and "pattern" are used with a different meaning in Frey from the meaning of those terms as used by Lin and the present claim 1.

Frey discloses that "Either form of dithering is controlled in such a way as to provide a repeatable and predictable trajectory of the observed image on the focal plane array." (see column 5, lines 18-20) Frey further discloses "FIG. 5 shows a representative four point dither motion across a focal plane array 14. The focal plane array 14 includes four detectors labeled 94, 96, 98 and 100. The dithering motion of an image point proceeds from detector 94, to detector 96, to detector 98, to detector 100, and back to detector 94." (see column 12, lines 43-48) In other words, the array will be shifted by one pixel in one direction then by one pixel in another direction as shown by Frey in Fig. 5.

Frey "is directed to a system that satisfies the need for reliably correcting **fixed pattern noise** errors in focal plane arrays. An apparatus having the properties of this ... includes a plurality of image detectors forming an array, a **dithering element for spatially moving an observed image relative to the array**, a temporal high pass filter having a non-zero DC response, and an image restoration element capable of **restoring an observed image with reduced fixed pattern noise from the dithered and high-pass filtered image**."(see column 2, line 63 to column 3, line 4) (emphasis added). In other words, **Frey intends to remove *fixed pattern noise* from an image. The noise is called "fixed pattern noise" because this is a static noise: each pixel detector has its own characteristics.** In particular Frey discloses "...because of manufacturing constraints and environmental conditions, the detectors fail to have identical operating characteristics. That is, substantially similar levels of infrared radiation at two different detectors can generate different responses at

each of the detectors. To the extent that two detectors generate different electrical responses upon exposure to the same level of infrared radiation, ***the detectors are said to display "spatial non-uniformity".*** **Spatial non-uniformity between detectors is caused by fixed pattern noise that includes** individual detector offsets, residual gain error in the detectors, fixed pattern electronic noise, and ***non-dithered optical structure*** **in the detectors field of view."** (see column 1, lines 21-33) (emphasis added). ***Therefore, the image is dithered (moves) on the sensor,*** so that a same input signal reaches different detectors. Since **the difference between output signals represents the fixed pattern noise**, the fixed pattern noise can be extracted and the image signal removed from *fixed pattern noise* can be recovered. Column 2, lines 12-23 reads: "The detector array line of sight is moved between consecutive image frames according to a predetermined pattern. ... Theoretically, if two ideal detectors view the same part of an image then the two ideal detectors generate the same response to that part of the image. Differences existing in the response of two detectors viewing the same part of an image can accordingly be characterized as error in the detector response."

The method mentioned above requires knowledge of the dithering pattern (the path used for moving the array). For the case that the Frey dithering (mechanical motion) is not adequately precise, an alternative embodiment is disclosed where "The only difference in the apparatus and method ... under these circumstances is the inclusion of an **adaptive restoration filter**. Such a filter **includes a means for performing scene-to-scene registration to**

measure the object space motion and to estimate a dither pattern from that motion. FIG. 12 illustrates a signal processor 20 modified to use scene-to-scene registration to dynamically estimate the dither pattern based on measurement of object space motion. **Referring to FIG. 12, the modified signal processor includes a clutter shift computer 41 having as inputs the reference image signal 53 and a reference image signal from a previous image** frame 53 obtained by passing the reference image signal 53 through a second memory circuit 49. The **clutter shift computer 41 derives the dither pattern by shifting the reference image signal 53 relative to the previous image frame 53' by an integer number of pixels.** For each shift, the clutter shift computer 41 calculates the correlation between the shifted reference image signal and the previous image frame." (See column 10, lines 37 – 56) **This is a simple motion estimation.**

The Examiner asserts that "...**the Office interprets such shifting** of the reference image signal functionally **equivalent to a change in spatial resolution** of the dither pattern since the dither pattern of Frey is directly related to the correlation of the shifted image with previous image frame data." (See page 3, lines 8-11 of the Official Letter) **However, in view of the present application, "change in spatial resolution"** relates to the spatial frequencies (a reduced spatial resolution of the pattern 01010101 is e.g. 00110011) and temporal resolution is the same for the temporal axis. The specification of the present invention reads at page 5, lines 4-8: "The spatial resolution of the eye is good enough to be able to see a fixed static pattern A, B, A, B but if a third

dimension, namely the time, is added in the form of an alternating function, then the eye will be only able to see the average value of each cell." Consequently, the Examiner's interpretation that **shifting** of the reference image signal functionally would be equivalent to **a change in spatial resolution** is incorrect.

In order to rely on equivalence as a rationale supporting an obviousness rejection, the equivalency must be recognized in the prior art, and cannot be based on applicant's disclosure or the mere fact that the components at issue are functional or mechanical equivalents. (See MPEP 2144.06) As discussed, the components at issue are not functional equivalents, and the prior fails to show that **shifting** of a reference image signal is functionally **equivalent to a change in spatial resolution** of a dither pattern. For this additional reason, the rejection fails to provide a proper prima facie case of obviousness.

Combination Lacks Rational Underpinning

Applicant further submits that the present 35 USC 103 rejection in view of Lin and Frey fails to provide a rational underpinning to support the legal conclusion of obviousness. The Examiner has stated that "the combination of Lin and Frey is just since they both are directed towards dithering". However, such a combination is improper since Frey's "dithering" is used for entirely different purposes and in fact has a different meaning as used by Lin or the present application.

It has been shown above that the term **"dither" according to Frey relates to pattern shifting. O'Neil (US 5,514,865 incorporated by reference**

by Frey) similarly discloses dithered to mean "moved" (column 8, line 38). This meaning of "dither" is clearly different than is the meaning of the term used by Lin and in the present Claim 1.

The Examiner's statements regarding the different meaning of the terms "dithering device filtering an image" and "temporal high pass filter" are based on an incorrect assumption that it could mean dither pattern modification –changing a characteristic (phase, amplitude, spatial resolution and temporal resolution) of the dithering function – instead of Frey's meaning of said terms – pattern shifting to determine fixed pattern noise. This is evident from the Examiner's assertion that "It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the dither **pattern modification based upon motion estimation techniques of Frey** with the dithering and motion vector calculation techniques of Lin in order to adjust the dithering process ..." (see page 3, lines 11-14 of the Official Letter of 8/1/2008).

For this additional reason, the rejection fails to provide a proper prima facie case of obviousness.

Combination Renders Primary Reference Inoperable

Applicant further submits that the present 35 USC 103 rejection in view of Lin and Frey fails to provide a rational underpinning to support the legal conclusion of obviousness since such a combination would render the invention of Lin inoperable for its intended purpose. If a proposed modification would render the prior art invention being modified unsatisfactory for its intended

purpose, then there is no suggestion or motivation to make the proposed modification. (See MPEP 2143.01 V, *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984) The Examiner contends that "It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the dither pattern modification based upon motion estimation techniques of Frey with the dithering and motion vector calculation techniques of Lin in order to adjust the dithering process on a scene –by-scene basis thereby creating a more precise dithering mechanism in video systems." However, the result of implementing "the dither pattern modification (pattern shifting) based upon motion estimation techniques of Frey with the dithering and motion vector calculation techniques of Lin in order to adjust the dithering process" are as follows:

Lin discloses the use of dithering for reducing the bit-width of a picture before storing size-reduced pictures in memory. These pictures will be used to estimate the motion between consecutive frames. Frey's dither pattern moves the whole image (for example) by one pixel from one frame to another. If this dithering is applied to Lin one frame would be moved by one pixel relative to another frame. This would lead to incorrect motion estimation where instead of having for a macro block a correct vector V, we would have a V + a dither offset.

Therefore, since the combination of Frey and Lin in the manner described by the Examiner would clearly modify Lin in a manner that would render Lin's invention unsatisfactory for its intended purpose of video compression the

combination fails to provide a rational underpinning to support the legal conclusion of obviousness.

For at least the above cited reasons, the prior art fails to teach, suggest, or render obvious each of the features recited in claim 1; reconsideration and removal of this 35 USC 103(a) rejection is respectfully requested. The rejection of independent claim 17 should be removed for the same reasons.

Claims 2-6, 18- 25 depend from allowable independent base claims, 1 and 17 respectively, and are allowable at least by reason of their dependence from allowable base claims.

Claims 3, 19 and 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lin (U.S. Patent 6,421,466) in view of Frey (U.S. Patent 5,925,875) and in further view of Correa et al. (EP 1136974 A1).

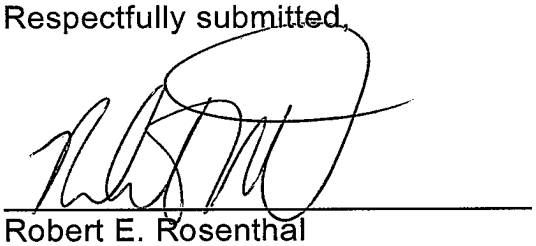
Claims 3, 19 and 24 depend from allowable independent base claims, 1 and 17 respectively, and are allowable at least by virtue of their dependence from allowable base claims.

CONCLUSION

Applicants believe they have addressed all outstanding grounds raised by the Examiner and respectfully submit the present case is in condition for allowance, early notification of which is earnestly solicited.

Should there be any questions or outstanding matters, the Examiner is cordially invited and requested to contact Applicants' undersigned attorney at his number listed below.

Respectfully submitted,



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